Figure 1

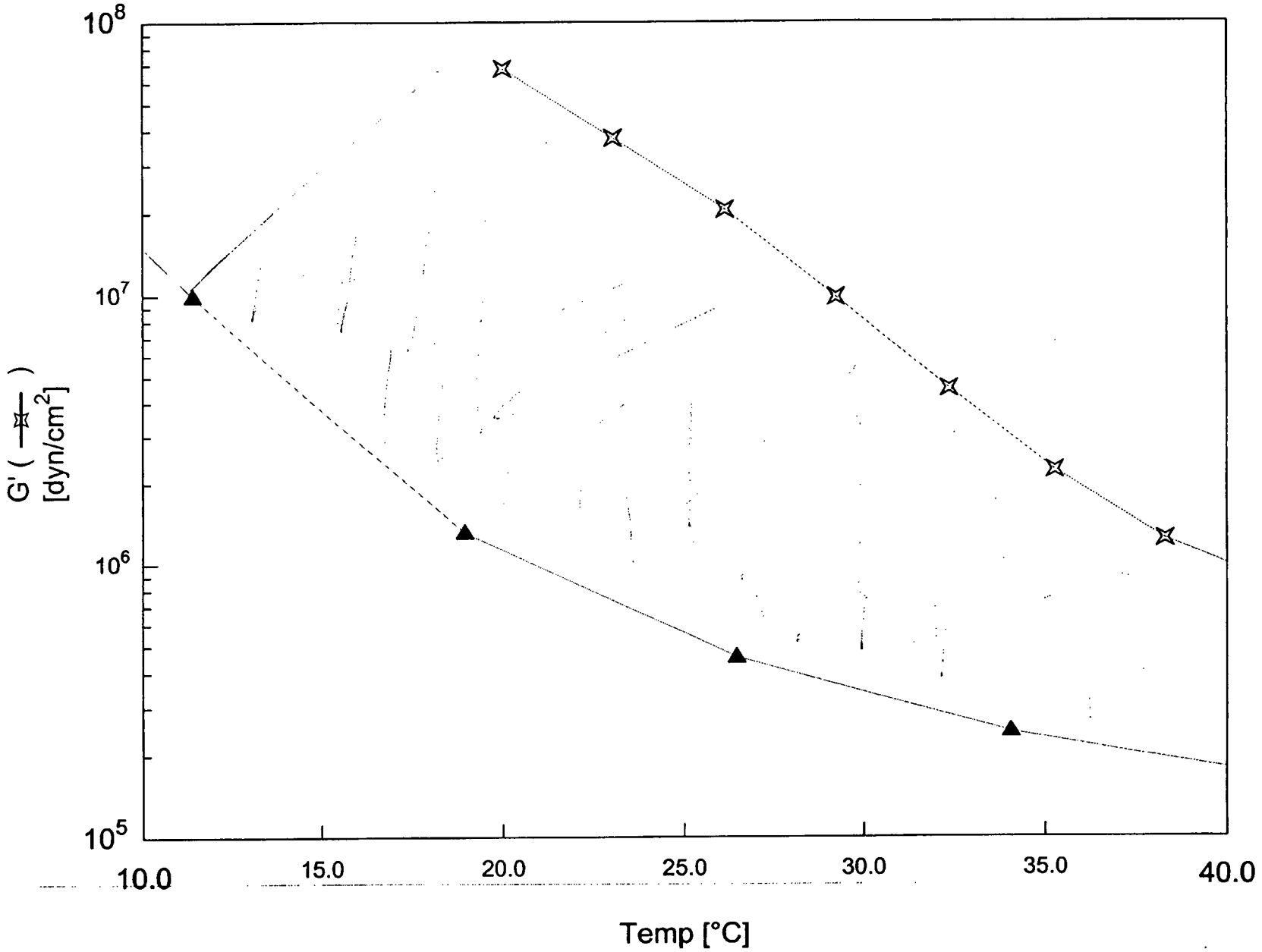


Figure 2

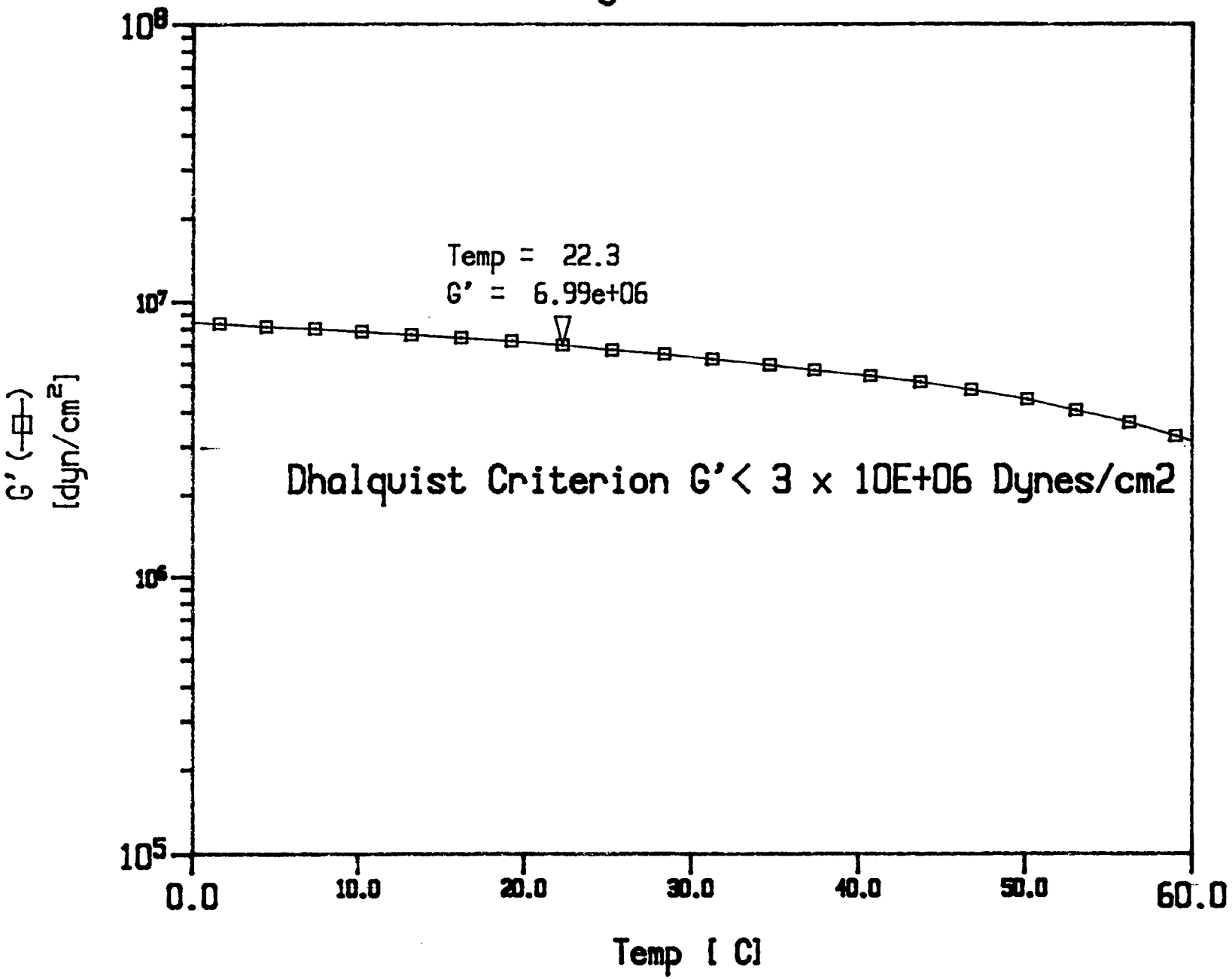

Temp = 22.3
G' = 6.99e+06
Dhalquist Criterion G'< 3 x 10E+06 Dynes/cm2
G' (±) [dyn/cm²]
10⁸
10⁷
10⁶
10⁵
0.0
10.0
20.0
30.0
40.0
50.0
60.0
Temp [C]

Figure 3

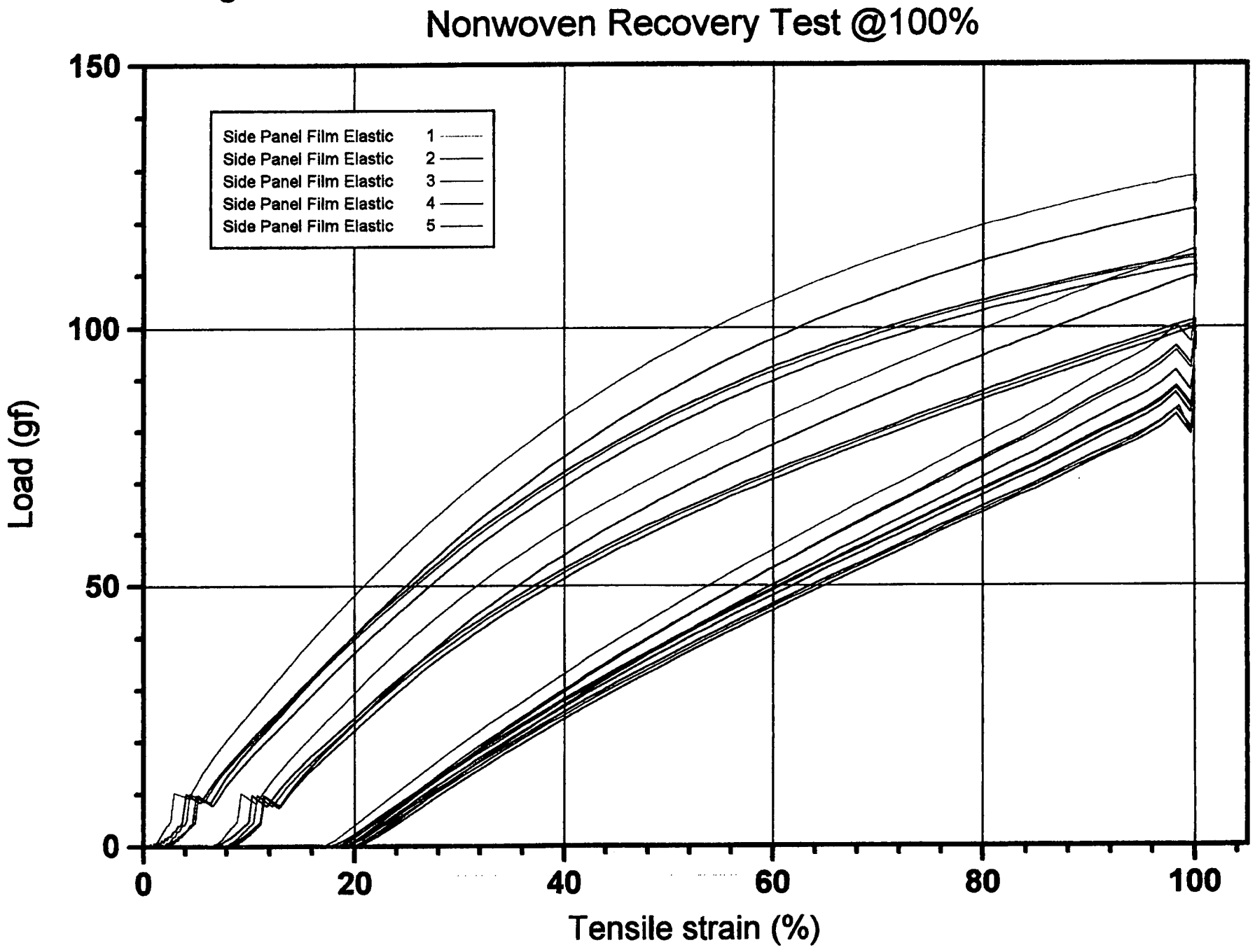

Nonwoven Recovery Test @100%
Side Panel Film Elastic 1
Side Panel Film Elastic 2
Side Panel Film Elastic 3
Side Panel Film Elastic 4
Side Panel Film Elastic 5
150
100
50
0
Load (gf)
0
20
40
60
80
100
Tensile strain (%)

Figure 4

	Load@1st 30% Strain (gf)	Load@1st 50%Strain (gf)	Load@1st 100%Strain (gf)	UnLoad@1st 50%Strain (gf)	UnLoad@1st 30%Strain (gf)	Relaxation (%)	Set (%)
1	67.40	95.53	129.01	45.73	19.54	20.7	18.6
2	58.10	83.56	113.75	39.56	16.16	20.7	19.7
3	57.21	82.80	113.26	39.12	15.65	20.8	20.0
4	59.63	87.91	122.68	42.35	16.18	20.0	20.6
5	54.91	80.80	112.01	38.15	14.57	20.7	20.6
Mean	59.45	86.12	118.14	40.98	16.42	20.6	19.9
S.D.	4.76	5.87	7.41	3.08	1.86	0.3	0.8
C.V.	8.01	6.81	6.27	7.51	11.34	1.7	4.2

	Load@2nd 30%Strain (gf)	Load@2nd 50%Strain (gf)	Load@2nd 100%Strain (gf)	UnLoad@2nd 50%Strain (gf)	UnLoad@2nd 30%Strain (gf)
1	47.68	72.75	114.96	42.48	16.79
2	41.12	63.61	101.44	36.78	13.85
3	40.17	63.05	100.74	36.21	13.29
4	42.07	67.73	109.86	39.41	13.80
5	38.96	61.96	99.88	35.51	12.50
Mean	42.00	65.82	105.38	38.08	14.05
S.D.	3.37	4.45	6.69	2.87	1.63
C.V.	8.03	6.76	6.35	7.53	11.58

Figure 5

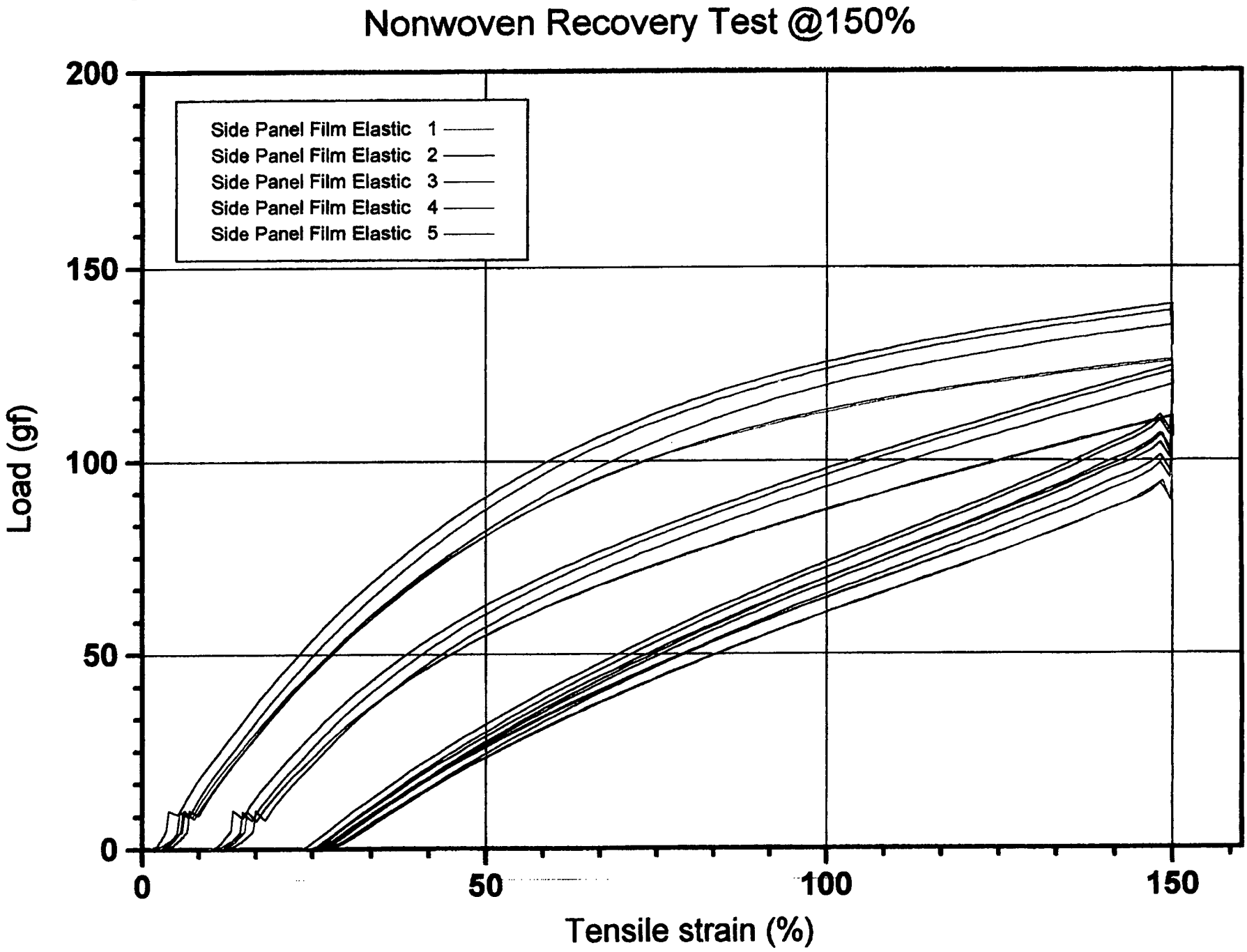

Nonwoven Recovery Test @150%
Side Panel Film Elastic 1
Side Panel Film Elastic 2
Side Panel Film Elastic 3
Side Panel Film Elastic 4
Side Panel Film Elastic 5
200
150
100
50
0
Load (gf)
0
50
100
150
Tensile strain (%)

Figure 6

	Load@1st 30% Strain (gf)	Load@1st 50%Strain (gf)	Load@1st 100%Strain (gf)	Load@1st 150%Strain (gf)	UnLoad@1st 50%Strain (gf)	UnLoad@1st 30%Strain (gf)	Relaxation (%)	Set (%)
1	54.66	81.01	112.81	125.84	26.85	5.25	10.7	27.3
2	63.18	91.00	125.77	140.57	32.31	8.82	10.0	25.0
3	54.03	80.87	113.45	126.26	26.30	4.71	11.1	27.2
4	54.78	82.27	119.85	135.02	27.79	4.60	9.4	27.6
5	58.95	87.81	123.94	138.84	30.33	6.70	9.7	26.3
Mean	57.12	84.59	119.16	133.31	28.72	6.02	10.2	26.7
S.D.	3.91	4.57	5.92	6.92	2.53	1.78	0.7	1.1
C.V.	6.84	5.40	4.97	5.19	8.83	29.53	7.0	4.0

	Load@2nd 30%Strain (gf)	Load@2nd 50%Strain (gf)	Load@2nd 100%Strain (gf)	Load@2nd 150%Strain (gf)	UnLoad@2nd 50%Strain (gf)	UnLoad@2nd 30%Strain (gf)
1	32.16	54.97	87.35	111.37	23.87	3.06
2	38.45	62.92	98.12	124.62	29.22	6.38
3	32.18	55.28	87.67	111.66	23.61	2.78
4	31.25	57.39	93.46	119.78	24.75	2.43
5	35.26	60.61	96.53	123.13	27.35	4.24
Mean	33.86	58.23	92.63	118.11	25.76	3.78
S.D.	2.98	3.45	4.96	6.27	2.44	1.61
C.V.	8.80	5.93	5.36	5.31	9.46	42.52

Figure 7

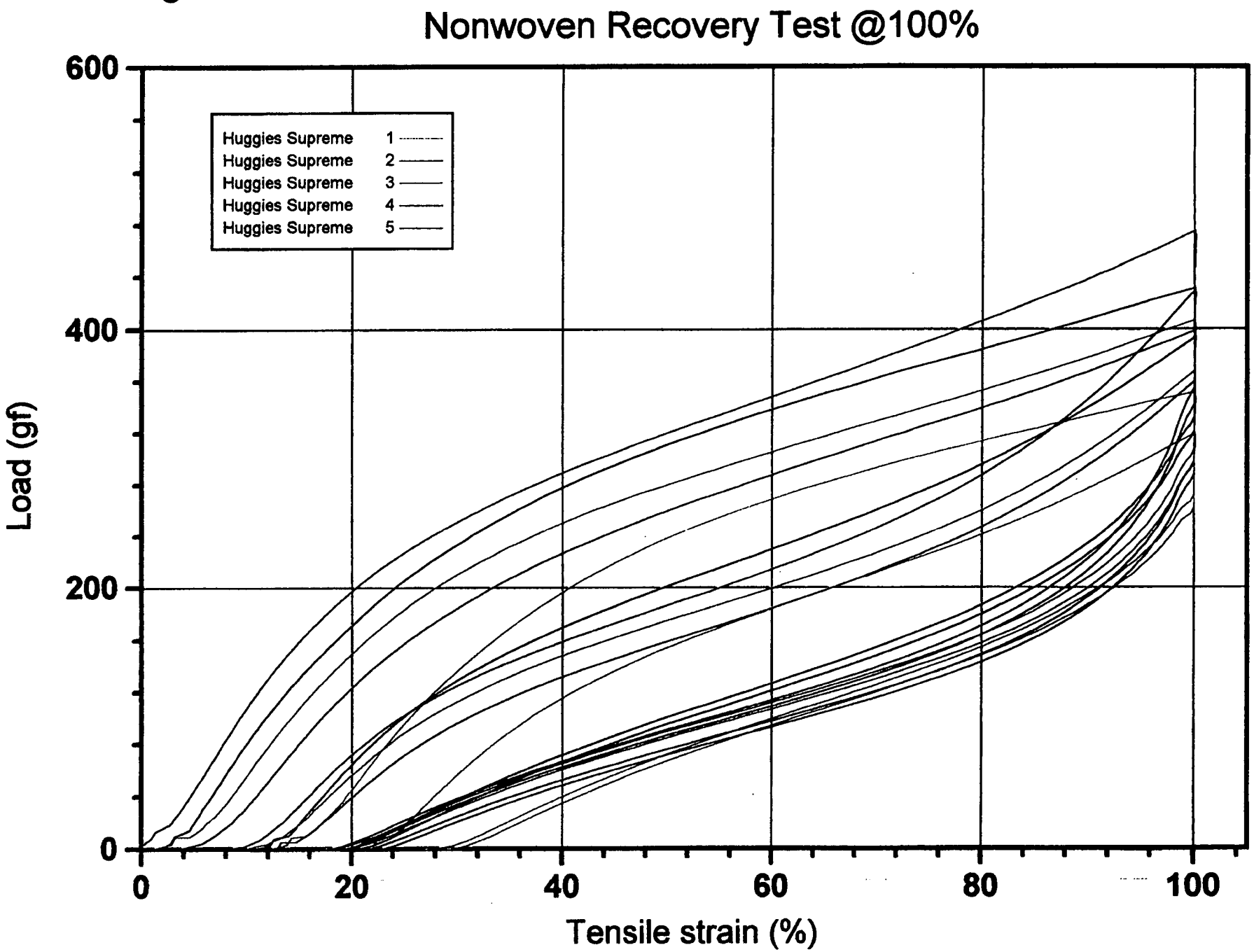

Nonwoven Recovery Test @100%
Huggies Supreme 1
Huggies Supreme 2
Huggies Supreme 3
Huggies Supreme 4
Huggies Supreme 5
600
400
200
0
Load (gf)
0
20
40
60
80
100
Tensile strain (%)

Figure 8

	Load@1st 30% Strain (gf)	Load@1st 50%Strain (gf)	Load@1st 100%Strain (gf)	UnLoad@1st 50%Strain (gf)	UnLoad@1st 30%Strain (gf)	Relaxation (%)	Set (%)
*1	136.76	239.11	351.97	72.86	4.42	-	28.9
2	234.11	311.57	431.96	101.19	38.65	23.0	19.8
3	210.79	280.51	407.04	90.35	37.03	24.3	18.8
4	185.13	260.46	399.32	76.87	25.84	25.1	22.1
5	251.81	320.90	476.29	91.75	39.31	25.3	18.5
Mean	220.46	293.36	428.65	90.04	35.21	24.4	19.8
S.D.	28.93	27.92	34.68	10.01	6.32	1.0	1.7
C.V.	13.12	9.52	8.09	11.12	17.95	4.3	8.3

	Load@2nd 30%Strain (gf)	Load@2nd 50%Strain (gf)	Load@2nd 100%Strain (gf)	UnLoad@2nd 50%Strain (gf)	UnLoad@2nd 30%Strain (gf)
*1	57.48	155.02	319.86	68.05	1.54
2	129.72	201.83	393.80	96.01	33.30
3	113.51	175.70	368.12	85.50	32.15
4	96.78	159.81	360.46	72.70	21.67
5	125.68	187.32	429.95	87.48	34.95
Mean	116.42	181.16	388.08	85.42	30.52
S.D.	14.80	17.80	31.34	9.63	6.01
C.V.	12.71	9.82	8.08	11.27	19.69

Figure 9

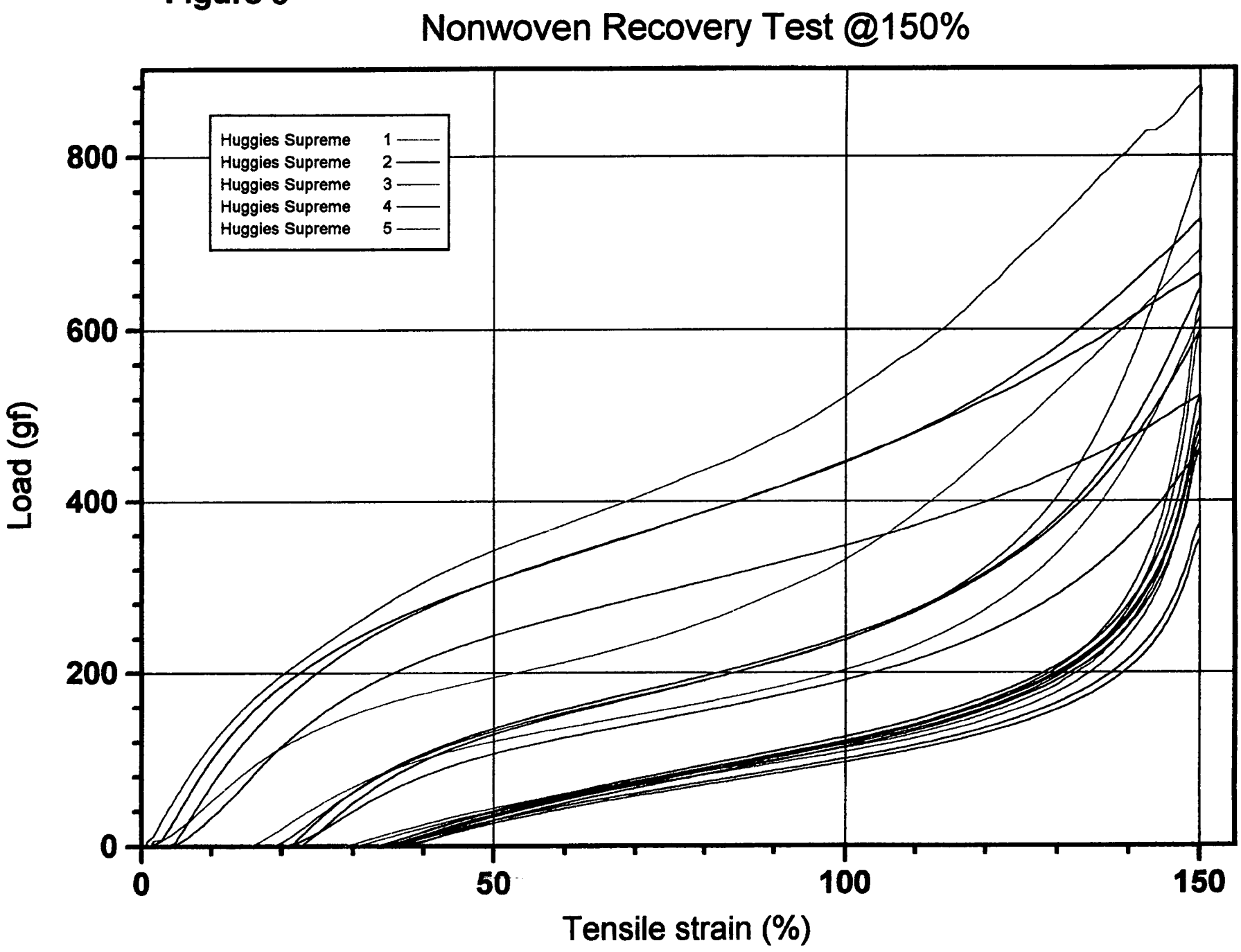
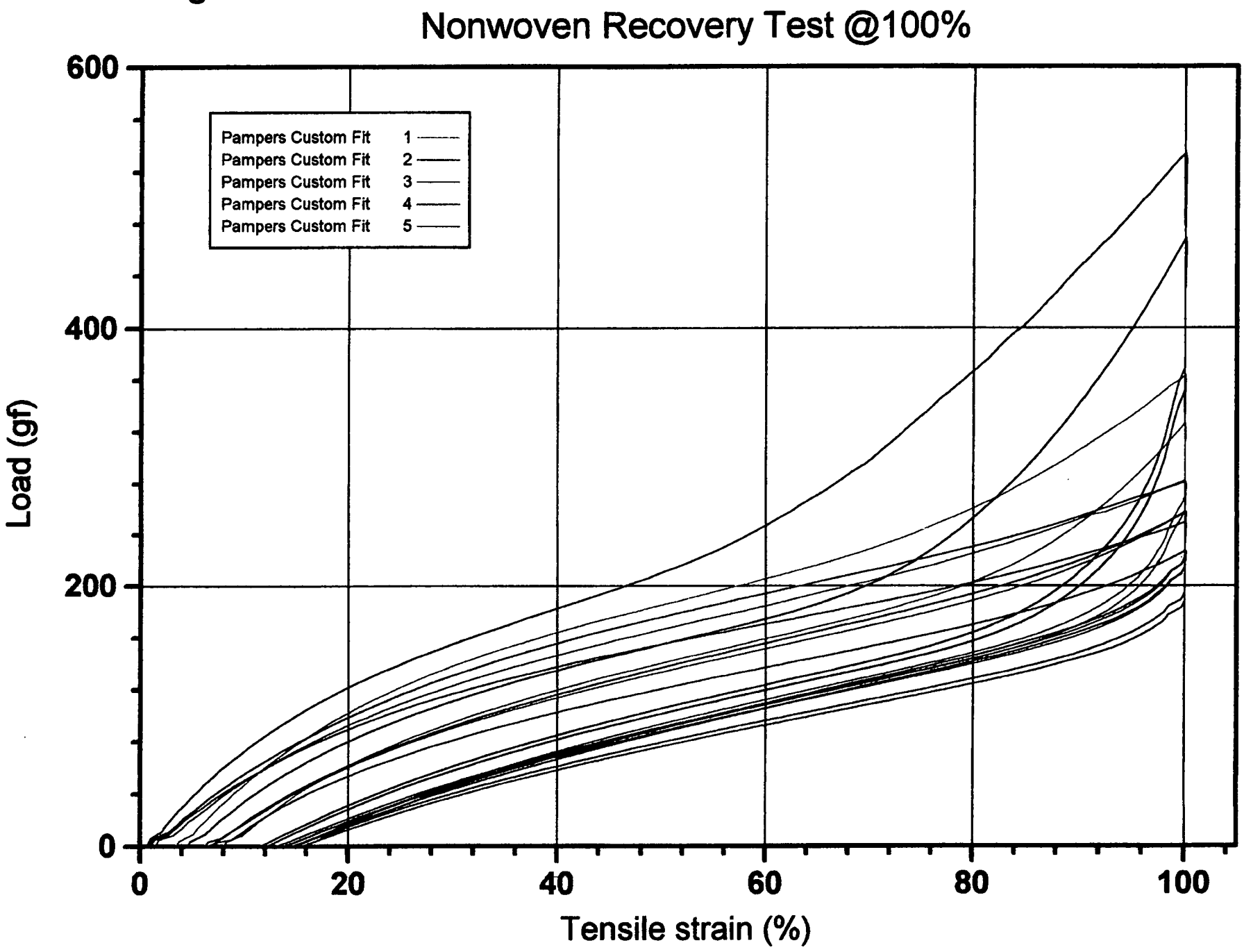

Nonwoven Recovery Test @150%
Huggies Supreme 1
Huggies Supreme 2
Huggies Supreme 3
Huggies Supreme 4
Huggies Supreme 5
800
600
400
200
0
Load (gf)
0
50
100
150
Tensile strain (%)

Figure 10

	Load@1st 30% Strain (gf)	Load@1st 50%Strain (gf)	Load@1st 100%Strain (gf)	Load@1st 150%Strain (gf)	UnLoad@1st 50%Strain (gf)	UnLoad@1st 30%Strain (gf)	Relaxation (%)	Set (%)
1	152.56	195.29	332.26	692.30	44.62	3.52	-48.6	29.3
2	239.58	307.88	447.55	665.22	34.83	-8.97	-7.8	36.6
3	256.80	343.16	523.38	882.35	40.09	-6.00	-19.9	33.8
4	230.78	307.94	446.55	728.68	41.67	-8.88	-16.8	34.2
5	176.79	244.51	348.79	523.71	30.93	-6.58	-7.3	35.7
Mean	211.30	279.76	419.70	698.45	38.43	-5.38	-20.1	33.9
S.D.	44.41	59.12	78.93	128.85	5.50	5.15	16.9	2.8
C.V.	21.02	21.13	18.81	18.45	14.30	-95.67	-84.0	8.3

	Load@2nd 30%Strain (gf)	Load@2nd 50%Strain (gf)	Load@2nd 100%Strain (gf)	Load@2nd 150%Strain (gf)	UnLoad@2nd 50%Strain (gf)	UnLoad@2nd 30%Strain (gf)
1	69.14	121.70	203.98	615.10	40.87	0.15
2	50.67	129.99	239.77	598.34	30.76	-9.35
3	63.08	133.42	239.02	789.83	37.25	-7.65
4	63.19	136.79	243.36	647.78	37.44	-9.72
5	41.29	107.50	192.14	461.21	27.74	-7.79
Mean	57.47	125.88	223.66	622.45	34.81	-6.87
S.D.	11.27	11.71	23.79	117.57	5.39	4.03
C.V.	19.62	9.30	10.64	18.89	15.47	-58.65

Figure 11


Nonwoven Recovery Test @100%
Pampers Custom Fit 1
Pampers Custom Fit 2
Pampers Custom Fit 3
Pampers Custom Fit 4
Pampers Custom Fit 5
600
400
200
0
Load (gf)
0
20
40
60
80
100
Tensile strain (%)

Figur 12

	Load@1st 30% Strain (gf)	Load@1st 50%Strain (gf)	Load@1st 100%Strain (gf)	UnLoad@1st 50%Strain (gf)	UnLoad@1st 30%Strain (gf)	Relaxation (%)	Set (%)
1	138.92	185.92	363.55	94.43	48.57	25.9	15.3
2	156.01	210.93	534.33	106.29	61.78	30.9	11.8
3	123.72	167.03	281.61	91.97	49.24	21.0	13.5
4	131.66	176.79	282.31	91.54	47.39	21.2	14.2
5	117.67	155.78	250.04	80.34	41.04	21.8	15.1
Mean	133.59	179.29	342.37	92.91	49.60	24.2	14.0
S.D.	14.88	20.94	115.24	9.25	7.55	4.3	1.4
C.V.	11.14	11.68	33.66	9.95	15.21	17.7	10.2

	Load@2nd 30%Strain (gf)	Load@2nd 50%Strain (gf)	Load@2nd 100%Strain (gf)	UnLoad@2nd 50%Strain (gf)	UnLoad@2nd 30%Strain (gf)
1	95.61	141.25	326.65	90.79	45.50
2	111.93	155.70	468.46	102.36	58.49
3	91.22	134.27	258.11	88.92	46.70
4	92.82	137.80	257.43	87.95	44.28
5	81.89	121.48	227.44	77.21	38.38
Mean	94.69	138.10	307.62	89.45	46.67
S.D.	10.93	12.35	96.99	8.96	7.34
C.V.	11.54	8.95	31.53	10.01	15.72

Figure 13

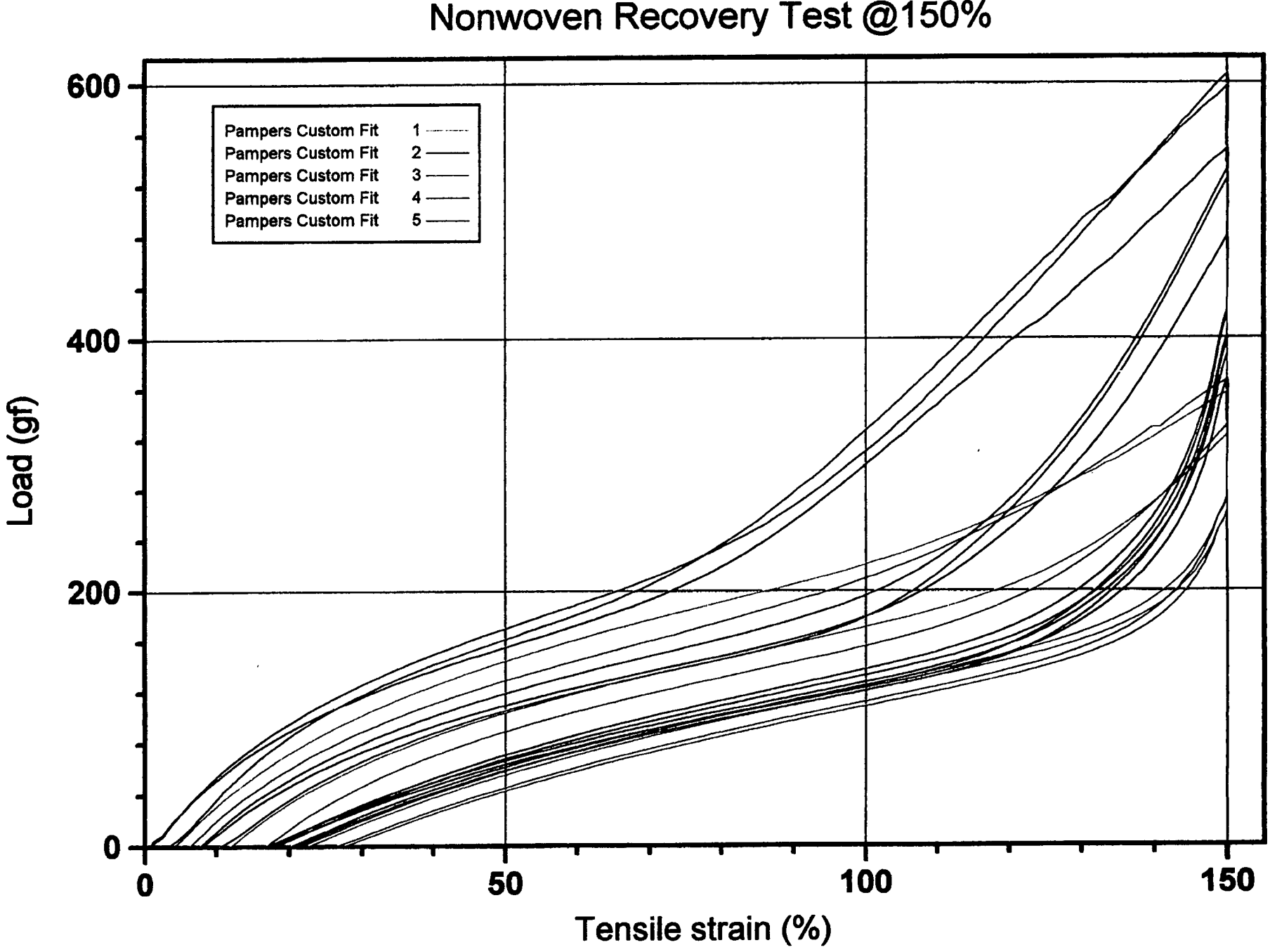

Nonwoven Recovery Test @150%
Pampers Custom Fit 1
Pampers Custom Fit 2
Pampers Custom Fit 3
Pampers Custom Fit 4
Pampers Custom Fit 5
600
400
200
0
Load (gf)
0
50
100
150
Tensile strain (%)

Figure 14

	Load@1st 30% Strain (gf)	Load@1st 50%Strain (gf)	Load@1st 100%Strain (gf)	Load@1st 150%Strain (gf)	UnLoad@1st 50%Strain (gf)	UnLoad@1st 30%Strain (gf)	Relaxation (%)	Set (%)
1	103.24	146.02	221.59	357.85	59.66	20.98	-23.3	21.9
2	117.60	157.06	301.54	549.08	67.49	31.87	-28.4	17.3
3	90.22	130.72	210.86	367.62	46.72	8.51	-30.4	27.0
4	127.47	171.77	312.13	607.65	72.31	33.25	-35.3	17.6
5	119.19	163.35	328.74	598.52	62.94	24.90	-27.4	20.5
Mean	111.54	153.78	274.97	496.14	61.82	23.90	-29.0	20.9
S.D.	14.77	15.95	54.63	123.86	9.70	9.97	4.4	3.9
C.V.	13.24	10.37	19.87	24.96	15.68	41.70	-15.1	18.9

	Load@2nd 30%Strain (gf)	Load@2nd 50%Strain (gf)	Load@2nd 100%Strain (gf)	Load@2nd 150%Strain (gf)	UnLoad@2nd 50%Strain (gf)	UnLoad@2nd 30%Strain (gf)
1	64.20	104.97	172.33	324.08	56.56	18.42
2	74.52	111.04	180.40	480.98	64.64	29.48
3	47.84	90.36	157.60	331.58	44.20	6.39
4	81.03	120.47	197.26	533.53	69.01	30.68
5	67.33	106.82	180.26	525.62	60.26	22.74
Mean	66.98	106.73	177.57	439.16	58.94	21.54
S.D.	12.53	10.94	14.40	103.61	9.47	9.84
C.V.	18.71	10.25	8.11	23.59	16.07	45.69

Figure 15.

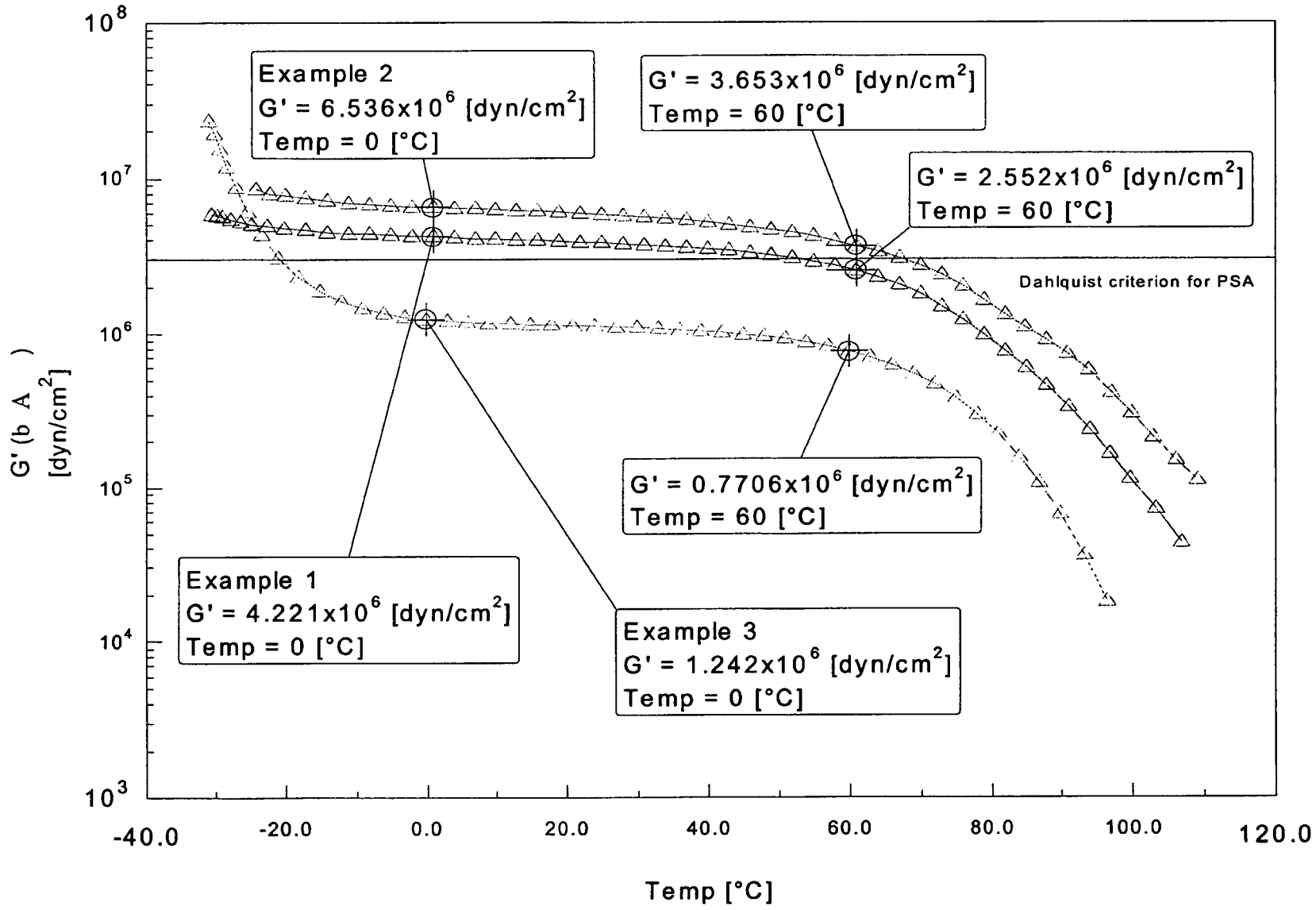

Example 2
G' = 6.536x10^6 [dyn/cm^2]
Temp = 0 [°C]
G' = 3.653x10^6 [dyn/cm^2]
Temp = 60 [°C]
G' = 2.552x10^6 [dyn/cm^2]
Temp = 60 [°C]
Dahlquist criterion for PSA
G' = 0.7706x10^6 [dyn/cm^2]
Temp = 60 [°C]
Example 1
G' = 4.221x10^6 [dyn/cm^2]
Temp = 0 [°C]
Example 3
G' = 1.242x10^6 [dyn/cm^2]
Temp = 0 [°C]
G' (b A) [dyn/cm^2]
Temp [°C]
10^8
10^7
10^6
10^5
10^4
10^3
-40.0
-20.0
0.0
20.0
40.0
60.0
80.0
100.0
120.0

Figure 16.

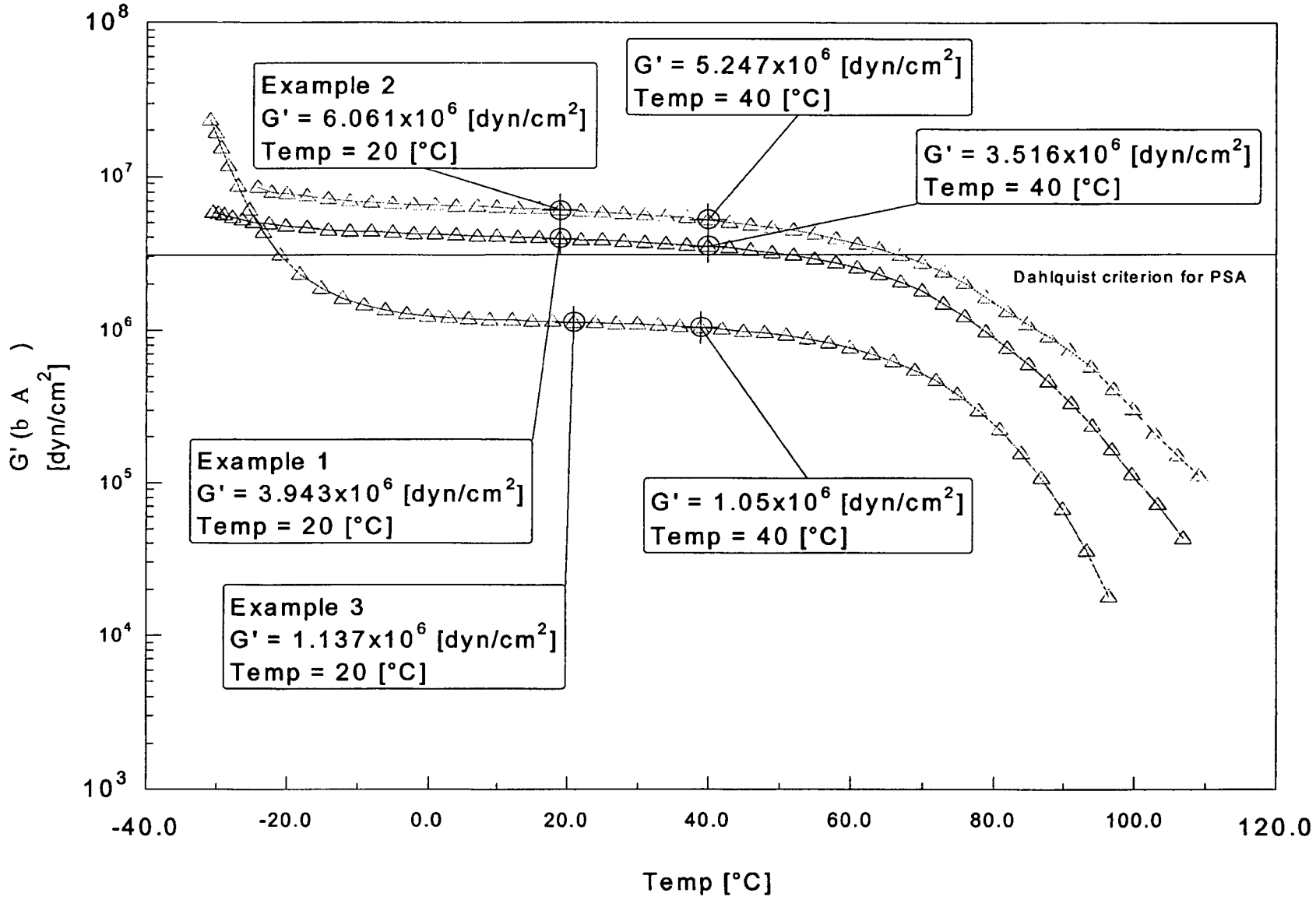

Example 2
G' = 6.061x10^6 [dyn/cm^2]
Temp = 20 [°C]
G' = 5.247x10^6 [dyn/cm^2]
Temp = 40 [°C]
G' = 3.516x10^6 [dyn/cm^2]
Temp = 40 [°C]
Dahlquist criterion for PSA
Example 1
G' = 3.943x10^6 [dyn/cm^2]
Temp = 20 [°C]
G' = 1.05x10^6 [dyn/cm^2]
Temp = 40 [°C]
Example 3
G' = 1.137x10^6 [dyn/cm^2]
Temp = 20 [°C]
G' (b A)
[dyn/cm^2]
10^8
10^7
10^6
10^5
10^4
10^3
-40.0
-20.0
0.0
20.0
40.0
60.0
80.0
100.0
120.0
Temp [°C]

FIGURE 17

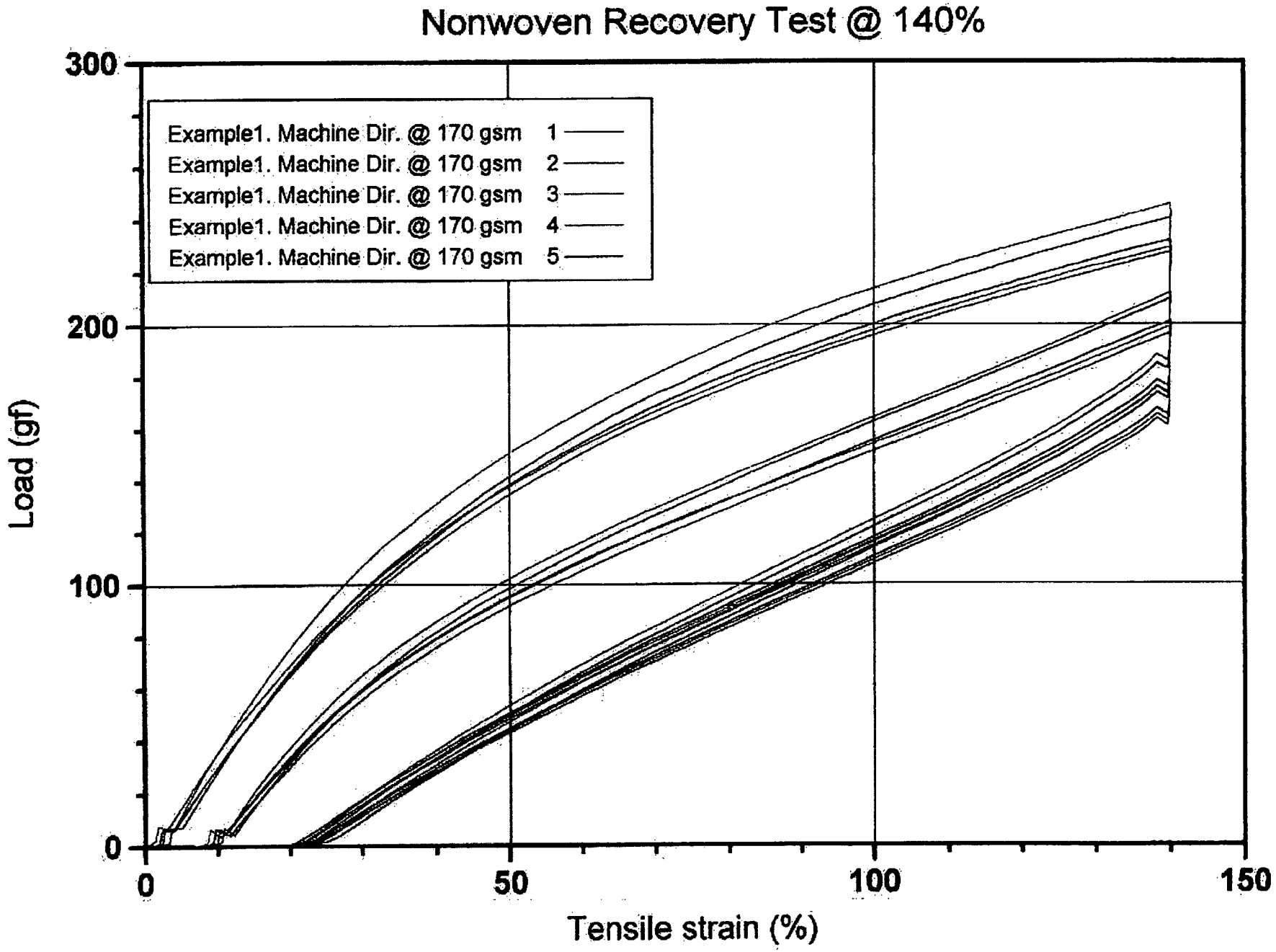

Nonwoven Recovery Test @ 140%
Example1. Machine Dir. @ 170 gsm 1
Example1. Machine Dir. @ 170 gsm 2
Example1. Machine Dir. @ 170 gsm 3
Example1. Machine Dir. @ 170 gsm 4
Example1. Machine Dir. @ 170 gsm 5
300
200
100
0
Load (gf)
0
50
100
150
Tensile strain (%)

FIGURE 18

	Load@1st 30%Strain (gf)	Load@1st 50%Strain (gf)	Load@1st 100%Strain (gf)	Load@1st 140%Strain (gf)	UnLoad@1st 50%Strain (gf)	UnLoad@1st 30%Strain (gf)	Relaxation (%)	Set (%)
1	213.877	150.992	213.877	245.871	53.904	17.797	22.2	22.0
2	200.380	138.594	200.380	232.232	50.992	18.078	21.7	21.0
3	197.955	138.080	197.955	229.521	49.925	16.372	21.9	21.7
4	196.067	134.860	196.067	227.533	48.855	16.177	22.3	21.7
5	207.674	141.781	207.674	240.675	50.616	15.248	21.7	22.6
Mean	203.191	140.861	203.191	235.167	50.858	16.734	22.0	21.8
S.D.	7.422	6.172	7.422	7.805	1.886	1.182	0.2	0.6
C.V.	3.653	4.382	3.653	3.319	3.709	7.060	1.1	2.7

	Load@2nd 30%Strain (gf)	Load@2nd 50%Strain (gf)	Load@2nd 100%Strain (gf)	Load@2nd 120%Strain (gf)	UnLoad@2nd 50%Strain (gf)	UnLoad@2nd 30%Strain (gf)
1	65.331	102.454	164.683	187.671	47.741	12.973
2	59.432	95.310	155.810	178.592	45.215	13.434
3	59.992	95.868	154.557	176.135	44.415	11.855
4	56.168	91.974	151.700	173.866	43.510	12.150
5	60.160	98.754	163.040	186.025	44.540	9.913
Mean	60.216	96.872	157.958	180.458	45.084	12.065
S.D.	3.287	3.941	5.621	6.096	1.604	1.358
C.V.	5.459	4.069	3.559	3.378	3.559	11.259

FIGURE 19

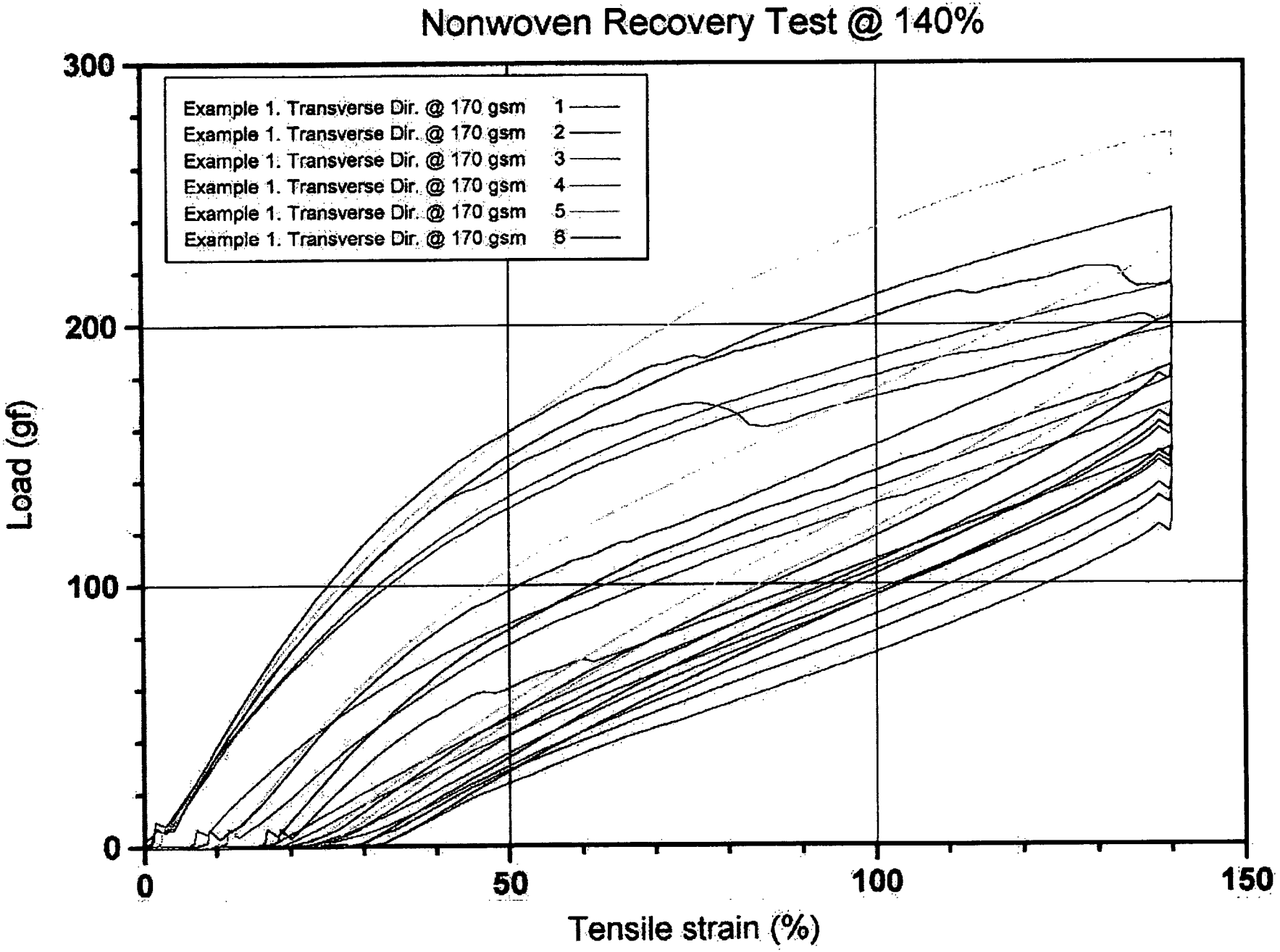

Nonwoven Recovery Test @ 140%
Example 1. Transverse Dir. @ 170 gsm 1
Example 1. Transverse Dir. @ 170 gsm 2
Example 1. Transverse Dir. @ 170 gsm 3
Example 1. Transverse Dir. @ 170 gsm 4
Example 1. Transverse Dir. @ 170 gsm 5
Example 1. Transverse Dir. @ 170 gsm 6
300
200
100
0
Load (gf)
0
50
100
150
Tensile strain (%)

FIGURE 20

	Load@1st 30%Strain (gf)	Load@1st 50%Strain (gf)	Load@1st 100%Strain (gf)	Load@1st 140%Strain (gf)	UnLoad@1st 50%Strain (gf)	UnLoad@1st 30%Strain (gf)	Relaxation (%)	Set (%)
1	187.247	134.373	187.247	215.385	48.781	20.886	24.4	18.0
2	203.302	149.861	203.302	216.148	34.226	1.944	23.4	30.1
3	181.013	129.835	181.013	201.965	35.932	8.152	24.7	23.7
*4	172.828	144.515	172.828	198.700	29.394	1.820	31.3	30.2
5	237.335	158.721	237.335	273.224	54.848	16.101	24.5	22.6
6	211.586	159.252	211.586	244.527	49.782	13.468	24.7	21.8
Mean	204.097	146.408	204.097	230.250	44.714	12.110	24.4	23.2
S.D.	22.239	13.675	22.239	28.594	9.111	7.311	0.5	4.4
C.V.	10.896	9.340	10.896	12.419	20.376	60.373	2.2	18.9

	Load@2nd 30%Strain (gf)	Load@2nd 50%Strain (gf)	Load@2nd 100%Strain (gf)	Load@2nd 140%Strain (gf)	UnLoad@2nd 50%Strain (gf)	UnLoad@2nd 30%Strain (gf)
1	56.059	85.364	137.531	179.596	42.829	16.337
2	40.956	83.176	144.259	184.475	28.718	0.246
3	42.219	77.498	131.716	170.204	30.875	5.121
*4	30.416	60.551	109.902	152.879	24.302	0.363
5	62.830	105.906	175.761	229.320	47.472	10.349
6	59.685	98.051	154.139	203.359	42.434	8.094
Mean	52.350	89.999	148.681	193.391	38.466	8.029
S.D.	10.122	11.642	17.283	23.440	8.194	5.988
C.V.	19.336	12.936	11.624	12.120	21.301	74.578

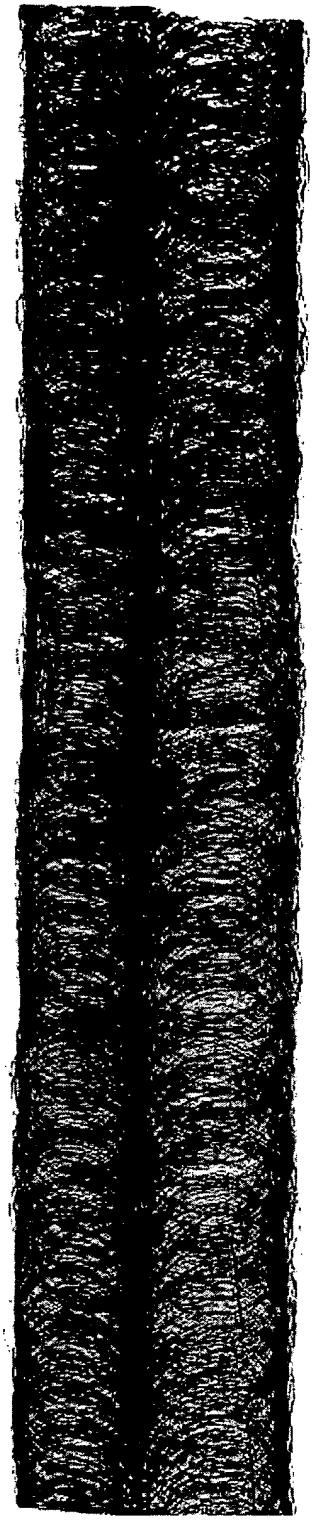



FIGURE 21